# F/A-18E/F Super Hornet and EA-18G Growler

## Executive Summary

- In FY11, the Navy conducted Software Qualification Testing (SQT) of System Configuration Set (SCS) H6E for F/A-18E/F Super Hornet and EA-18G Growler aircraft, SQT of SCS 23X for early-model F/A-18E/F aircraft, and a second FOT&E period for the APG-79 Active Electronically Scanned Array (AESA) radar. DOT&E issued individual classified reports on this testing for both F/A-18E/F and EA-18G in FY12.
- The APG-79 AESA radar provides improved performance relative to the legacy APG-73 radar; however, operational testing did not demonstrate a statistically significant difference in mission accomplishment between F/A-18E/F aircraft equipped with AESA and those equipped with the legacy radar.
- While SCSs H6E and 23X demonstrate acceptable suitability, the AESA radar's reliability continues to suffer from software instability. The radar's failure to meet reliability requirements and poor built-in test (BIT) performance remain as shortfalls from previous test and evaluation periods.
- Overall, the F/A-18E/F Super Hornet weapon system is operationally effective and suitable for most threat environments. However, the platform is not operationally effective for use in certain threat environments, the specifics of which are addressed in the DOT&E FY12 classified report.
- The EA-18G Growler weapon system is operationally effective and operationally suitable.
- The Navy is conducting F/A-18E/F and EA-18G SCS H8E SQT in two phases. Phase I operational testing commenced in 4QFY12 and is scheduled to complete in 1QFY13. The Navy expects to conduct Phase II testing during 2Q – 3QFY13. DOT&E will issue a single report covering both H8E phases after the completion of Phase II in 4QFY13.

## System

### F/A-18E/F Super Hornet

- The Super Hornet is the Navy's premier strike-fighter aircraft that replaces earlier F/A-18 variants in carrier air wings. The F/A-18E is a single-seat aircraft while the F model has two seats.
- F/A-18E/F Lot 26+ aircraft provide functionality essential for integrating all Super Hornet Block 2 hardware upgrades, which include:
  - Single pass multiple targeting for GPS-guided weapons
  - Use of off-board target designation
  - Improved datalink target coordination precision
  - Implementation of air-to-ground target points

- Additional systems include:
  - APG-73 or APG-79 radar
  - Advanced Targeting and Designation Forward-Looking Infrared System
  - AIM-9 infrared-guided missiles and AIM-120 and AIM-7 radar-guided missiles
  - Shared Reconnaissance Pod
  - Multi-functional Information Distribution System for Link 16 tactical datalink connectivity
  - Joint Helmet Mounted Cueing System
  - Integrated Defensive Electronic Countermeasures

### EA-18G Growler

- The Growler is the Navy's land- and carrier-based, radar and communication jamming aircraft.
- The two-seat EA-18G replaces the four-seat EA-6B. The new ALQ-218 receiver, improved connectivity, and linked displays are the primary design features implemented to reduce the operator workload in support of the EA-18G's two-person crew.
- The Airborne Electronic Attack (AEA) system includes:
  - Modified EA-6B Improved Capability III ALQ-218 receiver system
  - Advanced crew station
  - Legacy ALQ-99 jamming pods
  - Communication Countermeasures Set System
  - Expanded digital Link 16 communications network
  - Electronic Attack Unit
  - Interference Cancellation System that supports communications while jamming

  - Satellite receive capability via the Multi-mission Advanced Tactical Terminal
- Additional systems include:
  - APG-79 AESA radar
  - Joint Helmet Mounted Cueing System
  - High-speed Anti-Radiation Missile
  - AIM-120 radar-guided missiles

**System Configuration Set (SCS) Software**

- Growler and Super Hornet aircraft employ SCS operational software to enable major combat capabilities. All EA-18Gs and Block 2 F/A-18s (production Lot 26 and beyond) use high-order language or "H-series" software, while F/A-18E/F prior to Lot 26 and all legacy F/A-18 A/B/C/D aircraft use "X-series" software. The current fleet-release software are H6E and 23X, respectively.

**Mission**

- Combatant Commanders use the F/A-18E/F to:
  - Conduct offensive and defensive air combat missions
  - Attack ground targets with most of the U.S. inventory of precision and non-precision weapon stores
  - Provide in-flight refueling for other tactical aircraft
  - Provide the fleet with an organic tactical reconnaissance capability
- Combatant Commanders use the EA-18G to:
  - Support friendly air, ground, and sea operations by countering enemy radar and communications
  - Jam integrated air defense systems
  - Support non-integrated air defense missions and emerging non-lethal target sets
  - Enhance crew situational awareness and mission management
  - Enhance connectivity to national, theater, and tactical strike assets
  - Provide enhanced lethal suppression through accurate High-speed Anti-Radiation Missile targeting
  - Provide the EA-18G crew air-to-air self-protection with the AIM-120

**Major Contractor**

The Boeing Company, Integrated Defense Systems – St. Louis, Missouri

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**Activity**

- DOT&E reported on APG-79 radar IOT&E in FY07, assessing it as not operationally effective or suitable due to significant deficiencies in tactical performance, reliability, and BIT functionality.
- The Navy conducted APG-79 radar FOT&E in FY09 in conjunction with SCS H4E SQT. The Navy's Commander, Operational Test and Evaluation Force subsequently reported that significant deficiencies remained for both APG-79 AESA performance and suitability; DOT&E concurred with this assessment.
- Concurrent with SQT for SCSs H6E and 23X, the Navy conducted a second APG-79 radar FOT&E period in FY11. The Navy conducted the testing in accordance with the DOT&E-approved Test and Evaluation Master Plan (TEMP) and test plan. DOT&E issued a classified report on this testing in FY12; finding that the Super Hornet made incremental improvements, but still retained important deficiencies.
- The Navy is conducting F/A-18E/F and EA-18G SCS H8E SQT in two phases. Phase I operational testing was originally scheduled for 1QFY12, but due to multiple software anomalies during developmental testing, the Navy postponed the Operational Test Readiness Review until 3QFY12. H8E Phase I operational testing commenced in 4QFY12 and is scheduled to complete in 1QFY13. The Navy is conducting the testing in accordance with the DOT&E-approved TEMP and test plan.
- The Navy expects to conduct H8E Phase II operational testing during 2Q – 3QFY13.
- SCS H8E testing does not include an end-to-end multi-AIM-120 missile shot. This capability is a Navy operational requirement not previously demonstrated or successfully tested. The Navy tentatively plans to conduct a multi-missile shot in conjunction with SCS H12E testing.

**Assessment**

- The APG-79 AESA radar demonstrated marginal improvements since the previous FOT&E period and provides improved performance relative to the legacy APG-73 radar. However, operational testing does not demonstrate a statistically significant difference in mission accomplishment between F/A-18E/F aircraft equipped with AESA and those equipped with the legacy radar.
- Full development of AESA electronic warfare capability remains deferred to later software builds.
- While SCSs H6E and 23X demonstrate acceptable suitability, the AESA radar's reliability continues to suffer from software instability despite software upgrades. The radar's failure to meet reliability requirements and poor BIT performance remain as shortfalls from previous test and evaluation periods.
- Overall, the F/A-18E/F Super Hornet weapon system is operationally effective and suitable for most threat environments. However, the platform is not operationally effective for use in certain threat environments, the details of which are addressed in DOT&E's classified report.
- The EA-18G Growler weapons system is operationally effective and operationally suitable.
- DOT&E will report on Super Hornet and Growler SCS H8E capability improvements after both Phase I and II operational testing are complete in 4QFY13.

**Recommendations**

- Status of Previous Recommendations.
  - The Navy made minimal progress addressing FY11 F/A-18E/F recommendations. Recommendations to continue to improve APG-79 AESA reliability and BIT functionality, to conduct an operationally representative end-to-end missile shot to demonstrate APG-79 radar and current SCS ability to support multi-AIM-120 engagement, and to develop and characterize the APG-79 AESA's full electronic warfare capability remain valid.
  - The Navy satisfactorily addressed three of seven FY11 EA-18G recommendations. Recommendations to improve aircraft maintainability and BIT software maturity, to improve ALQ-218 and ALQ-99 maintenance documentation and diagnostic tools, and to assess the need for a more capable threat range at Whidbey Island, Washington, remain valid.
- FY12 Recommendations. None.